

CLAIMS

What is claimed is:

1. A hydro-pneumatic suspension system having a right side hydro-pneumatic strut cross-coupled to a left side hydro-pneumatic strut such that an upper chamber of the right side strut is fluidly connected to a lower chamber of the left side strut and an upper chamber of the left side strut is fluidly connected to a lower chamber of the right side strut, the suspension system further comprising:

a first accumulator fluidly connected with the upper chamber of the right side strut;

a second accumulator selectively fluidly connected with the upper chamber of the right side strut by a spring-rate valve;

a hydraulic supply selectively fluidly connected with the right side strut by a ride-height valve; and

a suspension control system adapted to control the spring-rate valve, hydraulic pump and ride-height valve to set the suspension system in one of an on-road configuration and an off-road configuration.

2. The suspension system of claim 1, further comprising a cross-flow valve for selectively fluidly disconnecting the right side strut from the left side strut.

3. The suspension system of claim 2, further comprising a conduit and an articulation valve for selectively fluidly connecting the upper chamber of the right side strut with the lower chamber of the right side strut.

4. The suspension system of claim 3, wherein the suspension control system opens the ride-height valve to connect the hydraulic supply to the right side strut to raise the overall height of the vehicle when converting from the on-road configuration to the off-road configuration.

5. The suspension system of claim 4, wherein the suspension control system further closes the ride-height valve, the cross-flow valve and the spring-rate valve, and opens the articulation valve to set the suspension system in the off-road configuration.

6. The suspension system of claim 3, wherein the suspension control system closes the articulation valve, and opens the cross-flow valve and the spring-rate valve to set the suspension system in the on-road configuration.

7. The suspension system of claim 2, wherein the cross-flow valve selectively fluidly connects the upper chamber of the right side strut with the lower chamber of the left side strut, the system further comprising a second cross-flow valve selectively fluidly connecting the upper chamber of the left side strut with the lower chamber of the right side strut.

8. The suspension system of claim 1, further comprising a third accumulator fluidly connected with the upper chamber of the left side strut and a fourth accumulator selectively fluidly connected with the upper chamber of the left side strut by a second spring-rate valve.

9. The suspension system of claim 8, further comprising a flow-restricting orifice fluidly connecting the first and second accumulators with the right side strut, and a second flow-restricting orifice fluidly connecting the third and fourth accumulators with the left side strut.

10. The suspension system of claim 1, wherein the suspension control system opens the ride-height valve to fluidly connect the hydraulic supply to the right side strut to raise the overall height of the vehicle, and closes the ride-height valve upon reaching a selected vehicle height.

11. In a vehicle having a hydro-pneumatic suspension system, the suspension system having a right side hydro-pneumatic strut cross-coupled to a corresponding left side hydro-pneumatic strut such that an upper chamber of the right side strut is fluidly connected to a lower chamber of the left side strut and an upper chamber of the left side strut is fluidly connected to a lower chamber of the right side strut, the suspension system further comprising:

a cross-flow valve for selectively fluidly connecting the right side strut from the left side strut;

an articulation valve for selectively fluidly connecting the upper chamber of the right side strut with the lower chamber of the right side strut;

a first accumulator fluidly connected with the upper chamber of the right side strut;

a second accumulator selectively fluidly connected with the upper chamber of the right side strut by a spring-rate valve;

a hydraulic supply selectively fluidly connected with the right side and left side struts by a ride-height valve; and

a suspension control system adapted to control the cross-flow valve, articulation valve and spring-rate valve to set the suspension system in one of an on-road configuration and an off-road configuration.

12. The suspension system of claim 11, wherein the suspension control system opens the ride-height valve and fluidly connects the hydraulic supply to raise the overall height of the vehicle.

13. The suspension system of claim 12, wherein the suspension control system further closes the cross-flow valve and the spring-rate valve, and opens the articulation valve to set the suspension system in the off-road configuration.

14. The suspension system of claim 11, wherein the suspension control system closes the articulation valve and the ride-height valve, and opens the cross-flow valve and the spring-rate valve to set the suspension system in the on-road configuration.

15. The suspension system of claim 11, wherein the cross-flow valve selectively fluidly connects the upper chamber of the right side strut with the lower chamber of the left side strut, the system further comprising a second cross-flow valve selectively fluidly connecting the upper chamber of the left side strut with the lower chamber of the right side strut.

16. The suspension system of claim 16, further comprising a second articulation valve for selectively fluidly connecting the upper chamber of the left side strut with the lower chamber of the left side strut.

17. The suspension system of claim 11, further comprising a third accumulator fluidly connected with the upper chamber of the left side strut and a fourth accumulator selectively fluidly connected with the upper chamber of the left side strut by a second spring-rate valve.

18. The suspension system of claim 17, further comprising a flow-restricting orifice fluidly connecting the first and second accumulators with the right side strut, and a second flow-restricting orifice fluidly connecting the third and fourth accumulators with the left side strut.